PCT WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 :
H04L 12/66, 29/06, H04Q 3/00

A1

(11) International Publication Number: **WO 98/28885**

(43) International Publication Date: 2 July 1998 (02.07.98)

(21) International Application Number: PCT/SE97/02087

(22) International Filing Date: 12 December 1997 (12.12.97)

(30) Priority Data:
9604784-0 20 December 1996 (20.12.96) SE

(71) Applicant: TELEFONAKTIEBOLAGET LM ERICSSON (publ) [SE/SE]; S-126 25 Stockholm (SE).

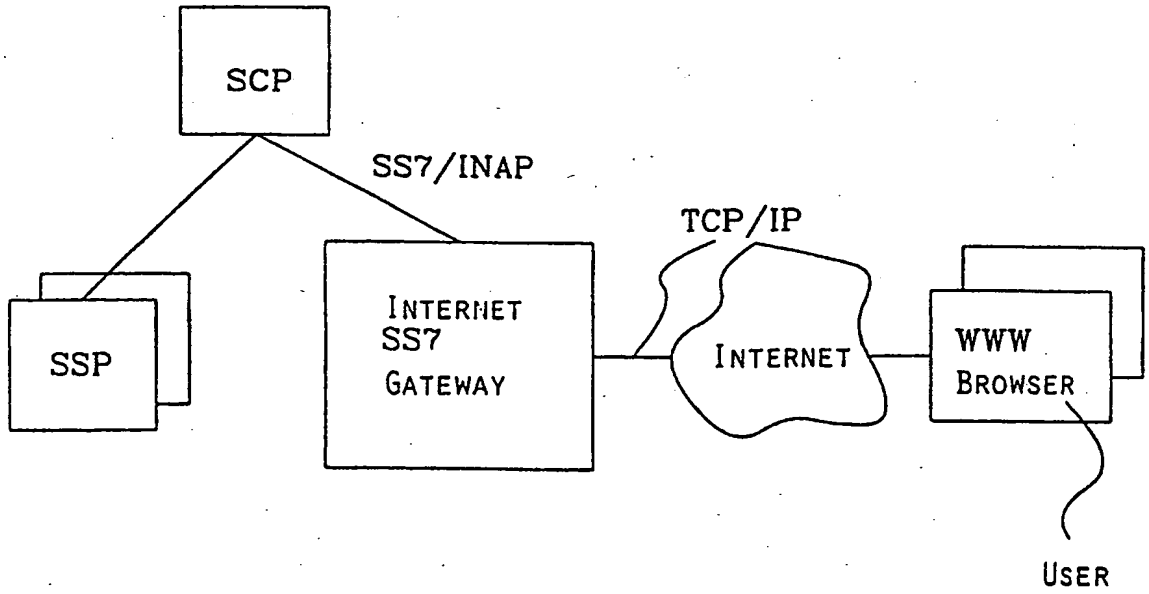
(72) Inventor: TRÄNK, Jörgen; Hallonstigen 3, S-665 35 Kil (SE).

(74) Agent: GÖTEBORGS PATENTBYRÅ AB; Sjöporten 4, S-417 64 Göteborg (SE).

(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).

Published
With international search report.
With amended claims.

(54) Title: INTERNET-SS7 GATEWAY



(57) Abstract

The present invention relates to a device between a unit connected to the Internet and a node in an intelligent network, where the device is provided with means for converting a signal from the node in the intelligent network into a compatible signal for the unit coupled to the Internet and vice versa. The invention also comprises a method for connecting an information server to a node in an intelligent network via the Internet.

BNSDOCID: <WO___9828885A1_I_>

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
AT	Austria	FR	France	LU	Luxembourg	SN	Senegal
AU	Australia	GA	Gabon	LV	Latvia	SZ	Swaziland
AZ	Azerbaijan	GB	United Kingdom	MC	Monaco	TD	Chad
BA	Bosnia and Herzegovina	GE	Georgia	MD	Republic of Moldova	TG	Togo
BB	Barbados	GH	Ghana	MG	Madagascar	TJ	Tajikistan
BE	Belgium	GN	Guinea	MK	The former Yugoslav Republic of Macedonia	TM	Turkmenistan
BF	Burkina Faso	GR	Greece			TR	Turkey
BG	Bulgaria	HU	Hungary	ML	Mali	TT	Trinidad and Tobago
BJ	Benin	IE	Ireland	MN	Mongolia	UA	Ukraine
BR	Brazil	IL	Israel	MR	Mauritania	UG	Uganda
BY	Belarus	IS	Iceland	MW	Malawi	US	United States of America
CA	Canada	IT	Italy	MX	Mexico	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NE	Niger	VN	Viet Nam
CG	Congo	KE	Kenya	NL	Netherlands	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NO	Norway	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's Republic of Korea	NZ	New Zealand		
CM	Cameroon			PL	Poland		
CN	China	KR	Republic of Korea	PT	Portugal		
CU	Cuba	KZ	Kazakstan	RO	Romania		
CZ	Czech Republic	LC	Saint Lucia	RU	Russian Federation		
DE	Germany	LI	Liechtenstein	SD	Sudan		
DK	Denmark	LK	Sri Lanka	SE	Sweden		
EE	Estonia	LR	Liberia	SG	Singapore		

BNSDOCID: <WO 9828885A1 >

INTERNET-SS7 GATEWAY

TECHNICAL FIELD

The present invention relates to an interface and a process for arranging said interface between an information server, e.g. a WWW-application, and a node in an intelligent network, e.g. a Service Control Point (SCP) so that communication can occur between them via CCITT Signal System No. 7.

RELATED ART

The number of different services in modern intelligent networks (IN) has increased rapidly of late. Most services require some form of guidance from an end user. In some simple services, the guidance from the end user only consists of changing a value, such as e.g. changing at which telephone the end user can be reached. Other services require more complicated guidance from the end user, such as the Virtual Private Network Service, where a subscriber can connect an extra telephone to the network and give it a new internal number.

In new services, the end user has a broad range of possibilities for determining the way in which the service will work. This possibility implies increased need for a simple and effective guidance from the end user. In most cases, the guidance is provided from the end user via the telephone with so-called DTMF-signalling (Dual Tone Multi Frequency). This method of guiding IN-services is acceptable when simple services are to be performed. Another method is controlling via a graphic interface in a WWW (World Wide Web) the services in an intelligent network. A so-called SCP (Service Control Point) in an intelligent network is, according to known technology, connected to World Wide Web via MML-signalling (Man-Machine Language). A serious disadvantage of this type of connection is that it is slow and that MML-signalling cannot be used to utilize a number of different standard services implemented in the SCP.

SDOCID: <WO___9828885A1_I_>

DESCRIPTION OF THE INVENTION

Recently, end users have been given more and more influence in controlling IN-services. This means that these end users will create a need for that control to be as rapid and user-friendly as possible. With known technology this is not satisfied, and this is a problem.

The purpose of the present invention is thus to solve the above mentioned problems by connecting a World Wide Web, WWW, to a Service Control Point, SCP, in an intelligent network by using SS7-signalling, specifically Intelligent Network Application Protocol, INAP.

The WWW-unit to which a user can be connected via a PC, for example, is in turn connected to the SCP in the intelligent network via a so-called Internet-SS7 Gateway. This Gateway makes it possible for the user, through Internet/WWW, for example, to connect himself via a normal traffic interface to a network node.

The Gateway communicates with the SCP over SS7-links by using INAP. The connection to Internet is effected via Transmission Control Protocol/Internet Protocol, TCP/IP, by using a suitable protocol, such as X.25 or Ethernet. The Internet-SS7 Gateway emulates a Service Switching Point, SCP, or a Service Data Point, SDP, to the SCP. The Gateway supports the same INAP functionality as a normal SCP/SDP. When the Internet-SS7 Gateway functions as a Service Switching Point, SSP, it gains the use of the INAP-operations which makes it possible for the user to change/update his parameters in the IN-services. When it functions as an SDP, it uses a so-called Update/Retrieve function to update the parameters in the IN-services.

The purpose of the present invention is, through a so-called Internet-SS7 Gateway, to make it possible to communicate with the SCP in an intelligent network from a WWW-unit via INAP.

An advantage of the present invention is that, by direct contact between a WWW-unit and the SCP in the intelligent network, rapid execution via SS7-links is obtained.

Another advantage of the present invention is that the same interface as for Dual Tone Multi Frequency, DTMF-signalling to the SCP is used, which means that all predefined services controlled by DTMF-signalling can be used.

An additional advantage of the present invention is that services can be triggered from the WWW-unit.

The invention will now be described in more detail with the aid of preferred embodiments and with reference to the accompanying drawings.

DESCRIPTION OF THE FIGURES

Figure 1 shows a network topology in which the invention is implemented.

Figure 2 shows an inner structure firstly in the SS7-link and secondly in the Internet link.

Figure 3 shows the portion of a flow chart, which covers step by step how a client can connect himself to a node in an intelligent network via the Internet.

Figure 4 shows a first example of the continuation of the flow chart of Figure 3.

Figure 5 shows a second example of the continuation of the flow chart of Figure 3.

Figure 6 shows a third example of the continuation of the flow chart of Figure 3.

Figure 7 shows a fourth example of the continuation of the flow chart of Figure 3.

NSDOCID: <WO__9828885A1_1>

PREFERRED EMBODIMENTS

In Figure 1 we see one example of a network topology in which the invention is implemented. A user is connected to the Internet via the WWW-browser shown in the Figure. The user can also connect himself to the Internet via another independent application with corresponding properties. The application can be written in program language C, Java, Smalltalk, Basic or some other programming language. Between the Service Control Point (SCP) and the Internet there is, in accordance with the invention, an Internet-SS7 Gateway. The purpose of said Internet-SS7 Gateway is to convert the program language from the Internet to a language which the SCP can handle and vice versa.

In Figure 1, four logical entities are identified. A first entity comprises the client, e.g. a WWW-browser. A second entity comprises the WWW-server or a unit with the corresponding function. A third entity comprises the inventive Internet-SS7 Gateway which can also be called the Inter Working Unit (IWU). The entities two and three can, as shown in this Figure, be arranged in the same physical machine but can also be arranged in separate physical machines. A fourth and last entity comprises a node in the intelligent network, e.g. the SCP.

Between the above mentioned entities there are arranged three interfaces, hereinafter called I1, I2, I3, counted from the WWW-client. The client uses initially Hyper Text Transfer Protocol, HTTP, to pick up an access page on the server. This page can thereafter be manipulated, e.g. by giving a user ID and a password. Now, either HTTP or Common Gateway Interface (CGI) can be used, depending on how the server page is implemented. As a reply to the User ID and the password, a page or a number of Java classes can be sent to the client via HTTP. None of the dialogue up to now interferes with the IWU. Only the interface I1 is affected.

RNSDOCID: WO 9828885A1 | >

At interface I2 there is an interface protocol between the inventive IWU and the server. The communication between the IWU and the user application, e.g. the WWW, comprises messages of socket type, for example. Socket communication is a process-to-process communication on a higher level of abstraction. When a message is sent to the WWW-unit the structure of the message is converted into strings of characters. The parameters included in the message are separated in a suitable manner, e.g. by so-called "null"-characters in the program language C. The WWW-application, or some other application with corresponding function, connected between the IWU and the client, can use the same structure for the internal messages as the IWU, but it is not forced to.

The IWU is closely bound to the application it is intended to serve. A message can, for example, include instructions as to which message the transmission is to start, how the message is to be sent and how many characters are to be obtained. The message can also comprise information on how the characters are to be received. This information passes the interface I2, i.e. between the WWW-server and the IWU.

In the IWU there can be a number of predefined messages which the IWU can obtain from the SCP. Incoming messages to the IWU are checked to see if they belong to the predefined messages. In the predefined messages, the values of most of the parameters are determined. An incoming message is regarded as accepted when its parameters agree with the parameters in the predefined message. The incoming message is then regarded as a message of internal message type, and the remaining parameters are used for this conversation.

When applications of WWW-type are used, there is the possibility of implementing internal functions. In order to save band width and to increase performance, the WWW-application can ask the client for both PUI and PIN at the same time and

BNSDOCID: <WO__9828885A1_I_>

then send these to the IWU together and at the same time. The IWU will in turn first send the PUI to the SCP, then wait for a response from the SCP as regards the PIN, and then the IWU will send the PIN-code to the SCP. When the IWU receives a response from the SCP as regards the PIN-code, the IWU will send a message to the WWW-application.

The same structure is used for handling the services. The WWW-application has knowledge of which information is required to change the PIN-code, for example. The WWW-application collects the required information and sends this to the IWU, which in turn processes the information and completes the operation.

A typical example of the functionality of the WWW-application is that, when sending a new PIN-code, i.e. changing it, the PIN-code need not be sent two times to the IWU to verify the code. The verification of the fact that the PIN-code is correctly typed can just as well be done in the WWW-application. Thus, the number of communications is significantly reduced between the two parties.

In each dialogue where the IWU is involved, the state of the dialogue is analyzed. The state is, in most cases, the most recent message sent from the IWU and is used to check if an incoming message is acceptable. When a message is received, its state is checked. For most states, only a specific message from the WWW-application or the SCP is accepted. This has to do with the fact that after initiation of the dialogue between the SCP and the WWW, the WWW-application only responds to special questions. By checking that the correct message has been obtained, we avoid errors and make it more difficult for unauthorized users to break in.

The IWU can use time spaces to handle the messages, firstly from the SCP and secondly from the WWW-application. The IWU checks for messages from the SCP during a given time interval. If there are messages in the queue, these will be proc-

BNSDOCID: <WO___9828885A1_I_>

essed. The IWU then checks for messages from the WWW-application during a given time interval. If there are messages in the queue, these are processed. It is a simple, but absolutely not optimal solution.

The IWU can also check the messages both from the SCP and from the WWW-application simultaneously. This can be done by virtue of the fact that in an operating system, UNIX for example, with associated hardware, there are built-in functions which permit the IWU to work with both queues simultaneously. One method is to use a function in UNIX which is called socket. This function permits the IWU-function to wait simultaneously for messages from both the IN-node and the information server.

In Figure 2 we see an internal architecture, which shows the SS7 signal and the signal from the Internet. The different types of SS7 signals are well known for a person skilled in the art and should not need to be described in more detail. The different protocols which are encompassed in the connection between the Internet and an application connected to the same should not need to be described in more detail here either, since they are also well known to a person skilled in the art.

The Internet-SS7 Gateway can be said to function as a bridge or a link between the SCP and a WWW-like application coupled to the Internet.

In Figure 3 we see a first part of a flowchart showing how a user of a computer, for example, can link up to an SCP in an intelligent network via the Internet.

Initially, a client can use HTTP, for example, to request an access page on an information server to an IN-node. The server can be a WWW-server, for example. The server can be connected to the Internet.

2NSDOCID: <WO__9828885A1_I_>

In the next step, the information server sends authorization formalities to the client which can comprise questions concerning the client's user identity and password.

In the next step, the client provides his user identity and associated password, which are sent to the information server. Here there are at least two different ways of choosing when this information is to be provided to the information server. A first way is to use HTTP and a second way is to use the Common Gateway Interface, CGI. Common Gateway Interface is a de facto standard for so-called gateway programs to interfaces towards information servers such as WWW. This standard is, of course, well known to a person skilled in the art and therefore need not be described in more detail here.

In the next step, the information server examines the password and the user identity. If the user identity and the password agree, the client will be given access to the requested application. If not, the client will, of course, not be given access, and the client can then be given a number of new tries to access the application.

Assuming the above process has occurred and the client is authorized, the next step then follows. In this step, the information server sends a menu of different operations which can be performed in the application.

In the next step, the client selects one of the operations which are available. In this stage, a communication is started between the client, on the one hand, and the IN-node, on the other hand, via the previously mentioned IWU. Here there are a number of conceivable alternatives for how this communication is to be established in practice.

BNSDOCID: <WO 9828885A1_1>

The IWU can consist of a separate physical unit or be included in the information server. If we assume that the information server and the IWU are arranged together, there are at least the three following alternatives.

In a first alternative, communication may take place via CGI from the client via the information server. This means that a so-called IWU-binary reads a common text string from standard input which the information server provides it with. The IWU then returns the messages to the client via standard output and via the information server. The protocol between the information server and the IWU could thus be normal so-called file descriptors (stdin/stdout) implemented in UNIX.

This alternative is represented in Figure 4. In a first stage, the information server sends input parameters to the CGI-program, the above mentioned stdin, stdout and the surrounding variables.

In the next step, the CGI-program communicates with the IN-node via SS7-implementation by using socket communication.

In the next step, the CGI-program returns the out-parameters via the information server to the client which in those cases where the parameters are of value to the user, are presented for him.

A second conceivable alternative would be that the client sets up a socket directly to the IWU (for example, in the program language Java and thus completely disconnects the server from the dialogue) after the initial dialogue with the information server. Thus, the protocol from the IWU to the client would be sockets. Another possibility would be using standard UNIX Remote Procedure Call (RPC) or some other machine-to-machine interface. Regardless of which level of abstraction is se-

3NSDOCID: <WO___9828885A1_I_>

lected, TCP/IP or UDP/IP are used as so-called low-level protocol. Even X.25 could be suitable as a protocol.

This alternative is represented in Figure 7. The IWU receives in-parameters from the client through one of the above mentioned machine-to-machine protocols. In the next step, the IWU communicates with SS7-implementation by using socket communication.

The out-parameters are then returned from the IWU to the client, whereafter these parameters can be visualized at the client.

A third alternative is that the IWU-process will be included in an information server where the behaviour of the server is increased with the behaviour of the IWU. The communication can then take place by direct internal process calling, i.e. direct communication between IWU and information servers, by using the built-in functions of the selected platform to transfer information between two functions (processes) within the same machine. This communication takes place at so-called method calling level or possibly wire communication depending on the configuration of the servers.

The third alternative is represented in Figure 6. In a first step, the information server sends in-parameters to the IWU by using the above mentioned communication at method calling level. The IWU-portion of the server then communicates with the SS7-implementation by using socket communication. In the next step, the out-parameters are returned from the IWU-portion of the server to the "core"-server, which in turn sends these to the client. These can, as in the other cases, be made visible to the user if they have any use therefor.

BNSDOCID: <WO__9828885A1_I_>

The information server and the IWU can be arranged in two separate machines or processes in the same machine. Figure 5 shows a flowchart for this example. In a first step, the information server sends in-parameters to the IWU by using a process-to-process communication protocol or a machine-to-machine communication protocol. RPC, for example, can be used as protocol and TCP/IP, UD/IP or X.25, for example, can be used as the protocol carrier.

The IWU then communicates with the SS7-implementation by using socket communication, for example, or some other corresponding process-to-process communication. The SS7-implementation then returns the out-parameters to the IWU which in turn, after processing, sends them to the information server. The out-parameters are then forwarded to the client. The out-parameters can then be visualized for the user. This alternative is shown in Figure 6.

The invention is, of course, not limited to the embodiments described above and shown in the drawings. Rather, it can be modified within the scope of the accompanying patent claims.

3NSDOCID: <WO___9828885A1_I_>

CLAIMS

1. Device between a unit connected to the Internet and a node in an intelligent network, **characterized** in that the device is provided with means for converting a signal from the node in the intelligent network into a compatible signal for the unit connected to the Internet and vice versa.

2. Device according to Claim 1, **characterized** in that the means for converting the signals is a program code written in a computer language.

3. Device according to Claim 2, **characterized** in that the computer language is C, Java, Smalltalk, Pascal, Fortran or Basic.

4. Device according to Claim 1, **characterized** in that the unit coupled to the Internet is an information server.

5. Device according to Claim 4, **characterized** in that the information server is a World Wide Web unit, a so-called WWW-unit.

6. Device according to one of the above claims, **characterized** in that the signal from the node in the intelligent network is a signal from Comité Consultatif International Télégraphique et Téléphonique Signal System No. 7, CCITT-SS7.

7. Device according to Claim 6, **characterized** in that the CCITT-SS7-signal is Intelligent Network Application Protocol, INAP.

8. Device according to Claim 1, **characterized** in that the signal from the WWW-unit is of the type Transmission Control Protocol / Internet Protocol, TCP/IP.

BNSDOCID: <WO___9828885A1_I_>

9. Device according to Claim 1, **characterized** in that the node in the intelligent network is a Service Control Point, SCP.

10. Method of connecting an information server to a node in an intelligent network via the Internet, **characterized** in

- that between the information server and the node in the intelligent network there is a so-called Inter Working Unit, IWU,
- that said IWU transforms a signal from the information server to a suitable signal for the node in the intelligent network,
- that said IWU transforms a signal from the node in the intelligent network into a suitable signal for the information server.

11. Method according to Claim 10, **characterized** in that the information server is a WWW-application.

12. Method according to Claim 11, **characterized** in that the node in the intelligent network is a Service Control Point, SCP.

13. Method according to Claim 12, **characterized** in that the signal from the SCP is INAP.

14. Method according to Claim 13, **characterized** in that the signal from the WWW-application is TCP/IP.

:NSDOCID: <WO___9828885A1_I_>

AMENDED CLAIMS

[received by the International Bureau on 28 May 1998 (28.05.98), original claims 1-14 replaced by new claims 1-15 (2 pages)]

1. Device between a unit connected to the Internet and a node in an intelligent net work (IN), *characterized in* that the device is provided with means for emulating a Service Switching Point (SSP) or a Service Data Point (SDP) to a Service Central Point (SCP) of the IN by converting a signal from Comité Consultatif International Telegraphique et Téléphonique Signal System No. 7, CCITT-SS7 from the node in the IN into a compatible signal for the unit connected to the Internet and vice versa.

2. Device according to claim 1, *characterized in* that the means for converting the signals is a program code written in a computer language.

3. Device according to claim 2, *characterized in* that the computer language is C, Java, Smalltalk, Pascal, Fortran or Basic.

4. Device according to claim 1, *characterized in* that the unit coupled to the Internet is an information server.

5. Device according to claim 4, *characterized in* that the information server is a World Wide Web unit, a so-called WWW-unit.

6. Device according to one of the above claims, *characterized in* that the signal CCITT-SS7 is Intelligent Network Application Protocol, INAP.

7. Device according to claim 1, *characterized in* that the signal from the WWWunit is of the type Transmission Control Protocol/Internet Protocol, TCP/IP.

8. Device according to claim 1, *characterized in* that the node in the intelligent network is a Service Control Point, SCP.

9. Device according to one of the above claims, *characterized in* that the Dual Tone Multi Frequency, DTMF signalling to the node is used.

10. Device according to claim 9, *characterized in* that predefined services controlled by DTMF

ENSDOCID: <WO___9828885A1_L>

controlled by DTMF signalling are used.

11. Method of connecting an information server to a node in an intelligent network (IN) via the Internet, *characterized in*
- that between the information server and the node in the intelligent network there is a so-called Inter Working Unit, IWU, emulating a Service Switching Point (SSP) or a Service Data Point (SDP) to a Service Central Point (SCP) of the IN,
- that said IWU transforms a signal from the information server to a signal from Comité Consultatif International Telegraphique et Téléphonique Signal System No. 7, CCITT-SS7 in the intelligent network,
- that said IWU transforms a signal from the node in the intelligent network into a suitable signal for the information server.

12. Method according to claim 11, *characterized in* that the information server is a WWW-application.

13. Method according to claim 11, *characterized in* that the node in the intelligent network is a Service Control Point, SCP.

14. Method according to claim 13, *characterized in* that the signal from the SCP is INAP.

15. Method according to claim 12, *characterized in* that the signal from the WWW-application is TCP/IP.

ENSDOCID: <WO___9828885A1_I_>

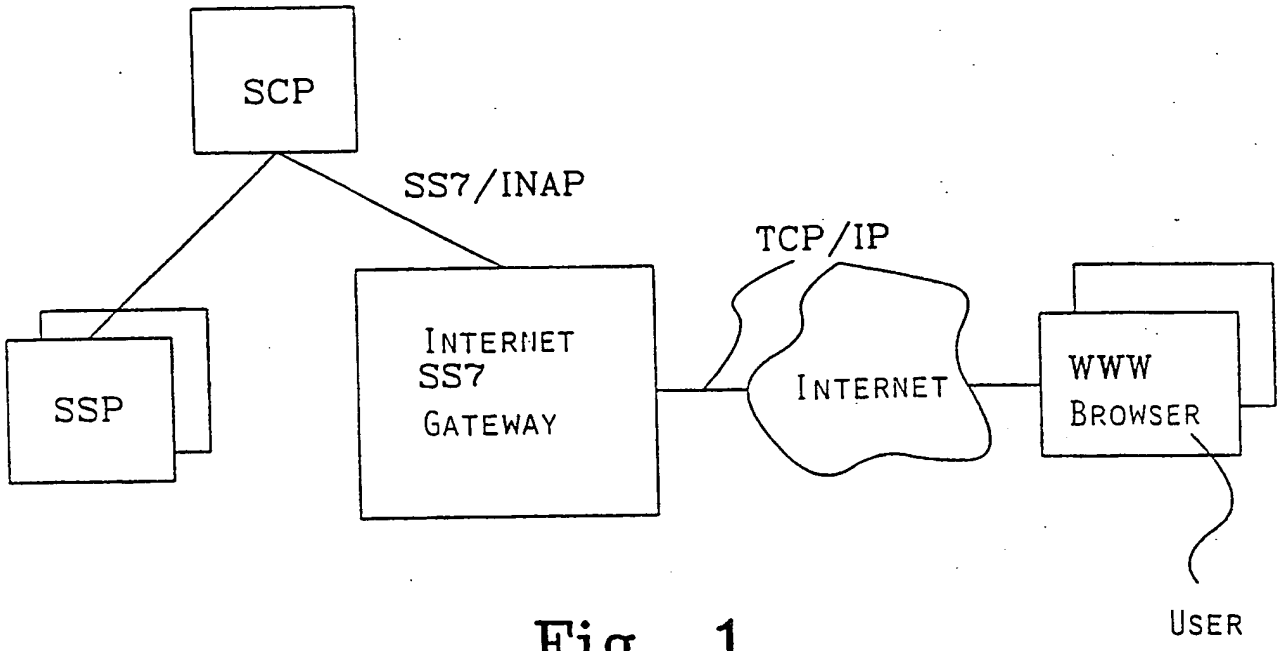


Fig. 1

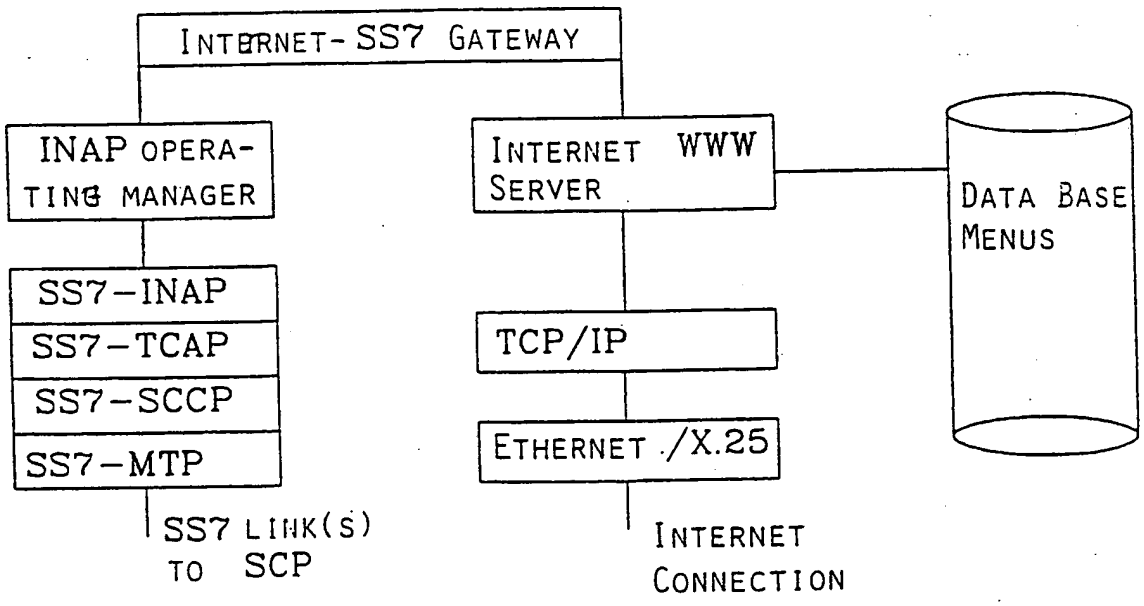


Fig. 2

BNSDOCID: <WO___9828885A1_I_>

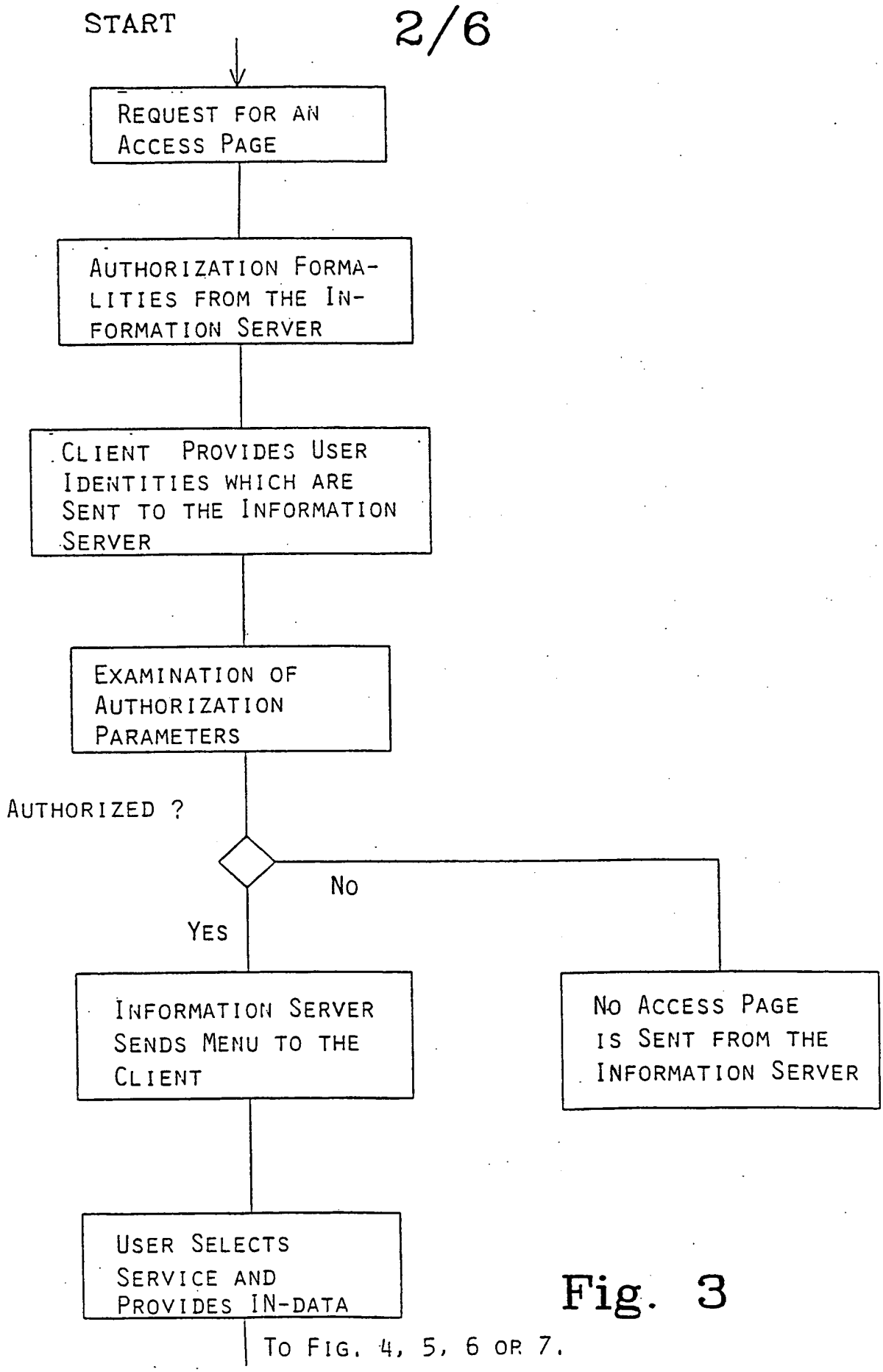


Fig. 3

:\NSDOCID: <WO___9828885A1_I_>

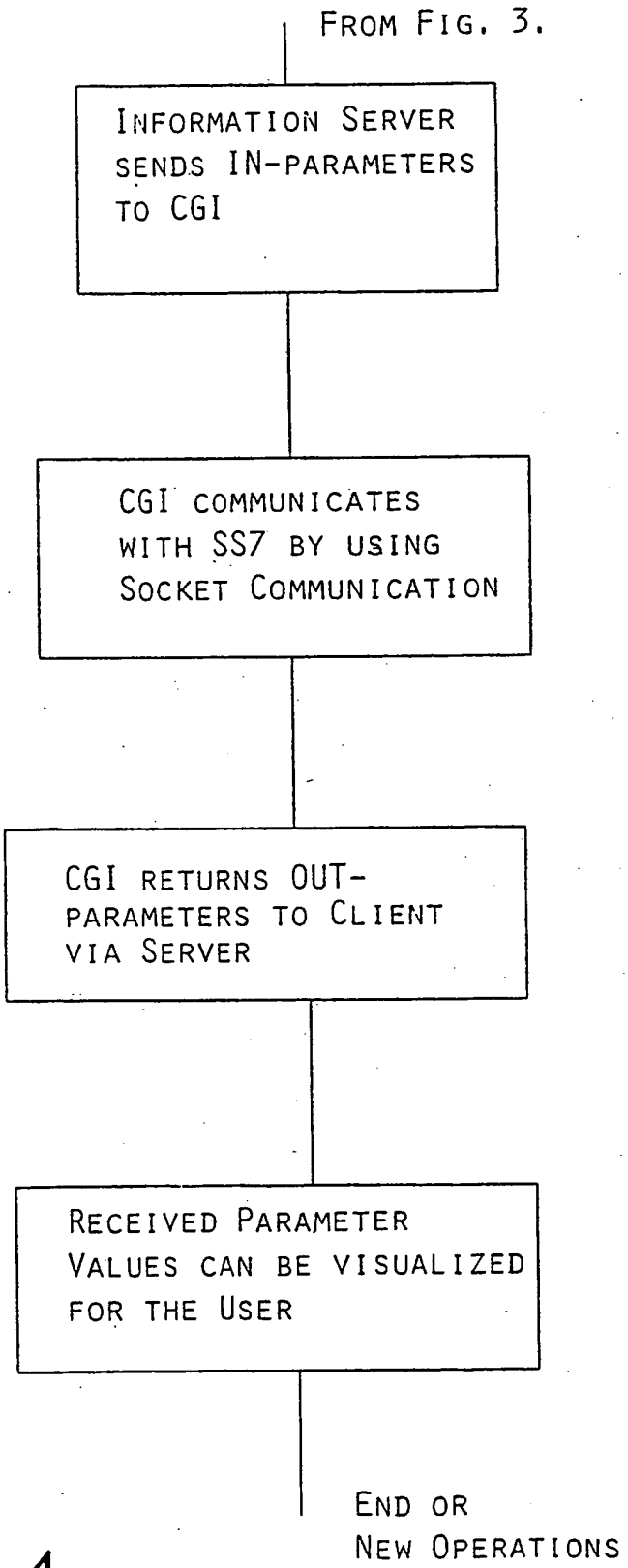


Fig. 4

3NSDOCID: <WO___9828885A1_I_>

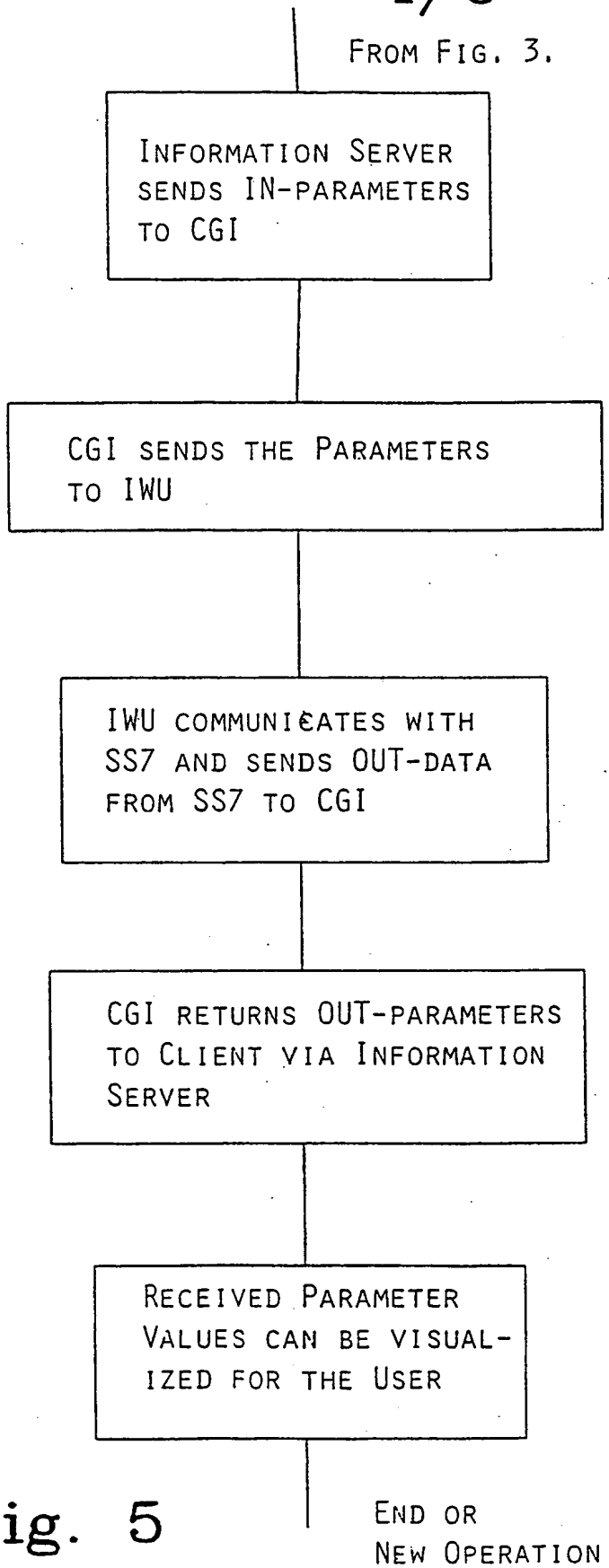


Fig. 5

3NSDOCID: <WO___9828885A1_I_>

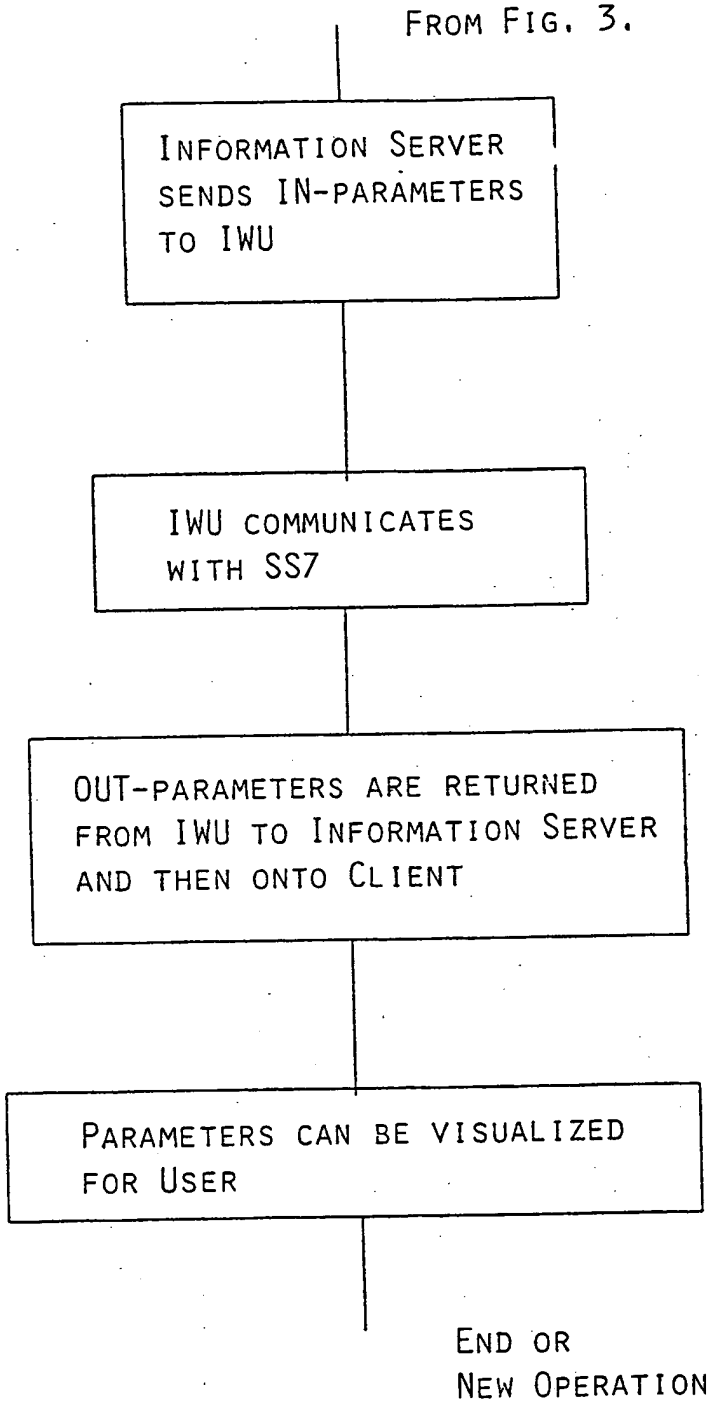


Fig. 6

EMEDOCID: <WO 9828885A1 I>

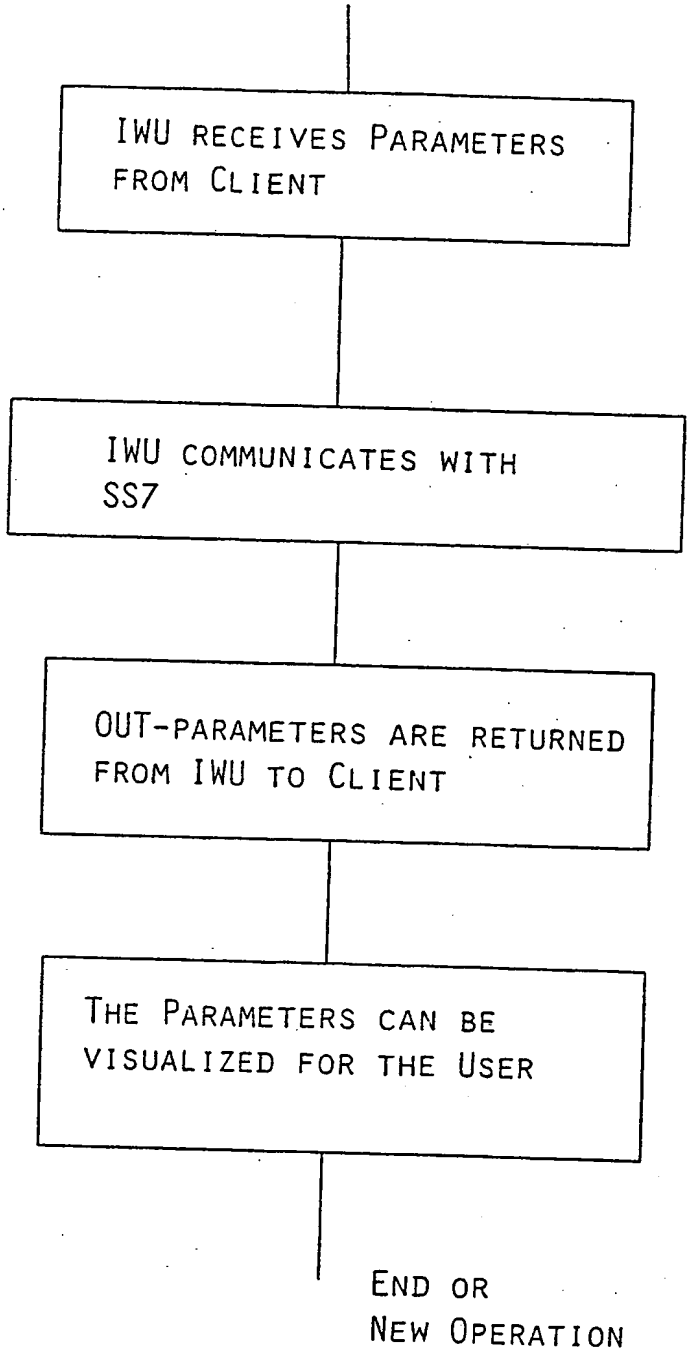


Fig. 7

ENSDOCID: <WO___9828885A1_I_>

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 97/02087

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: H04L 12/66, H04L 29/06, H04Q 3/00
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: H04L, H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPI, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 9638018 A1 (TELEFONAKTIEBOLAGET LM ERICSSON), 28 November 1996 (28.11.96), page 4, line 13 - page 5, line 35, figure 1 --	1-14
Y	WO 9638962 A1 (SIEMENS AKTIENGESELLSCHAFT), 5 December 1996 (05.12.96), page 10, line 12 - page 13, line 14; page 19, line 1 - page 21, line 9, figure 1 --	1-14
E	WO 9722211 A1 (HEWLETT-PACKARD COMPANY), 19 June 1997 (19.06.97), page 4, line 26 - page 20, line 2 --	1-14

[X] Further documents are listed in the continuation of Box C. [X] See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" erlier document but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
14 May 1998	15 -05- 1998
Name and mailing address of the ISA/ Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86	Authorized officer Friedrich Kühn Telephone No. +46 8 782 25 00

Form PCT/ISA/210 (second sheet) (July 1992)

BNSDOCID: <WO__9828885A1_1_>

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 97/02087

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
E	WO 9716007 A1 (TELECOM FINLAND OY), 1 May 1997 (01.05.97), page 3, line 21 - page 6, line 30	1-14

--

Form PCT/ISA/210 (continuation of second sheet) (July 1992)

BNSDOCID: <WO___9628886A1_I_>

INTERNATIONAL SEARCH REPORT

Information on patent family members

29/04/98

International application No.
PCT/SE 97/02087

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9638018 A1	28/11/96	AU 5916696 A	11/12/96
		EP 0829181 A	18/03/98
		FI 952557 D	00/00/00
		NO 975343 A	21/01/98
		FI 961690 A	25/11/96
WO 9638962 A1	05/12/96	EP 0830776 A	25/03/98
WO 9722211 A1	19/06/97	AU 1104097 A	03/07/97
		AU 1104297 A	03/07/97
		AU 1104697 A	03/07/97
		AU 1181397 A	03/07/97
		WO 9722209 A	19/06/97
		WO 9722210 A	19/06/97
		WO 9722212 A	19/06/97
		GB 9525190 D	00/00/00
		GB 9603589 D	00/00/00
WO 9716007 A1	01/05/97	AU 7302596 A	15/05/97
		FI 955093 D	00/00/00
		FI 955810 A	26/04/97

BNSDOCID: <WO___9828885A1_I_>